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Elements of Social Sustainability among Austrian Hay Milk Farmers: Between Satisfaction and Stress

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Abstract: Proponents of hay milk farming claim several benefits on an ecological and economic level, while little about the social aspects has been studied so far. The present study serves as a first exploration of certain aspects of social sustainability from the perspective of hay milk farmers. The results of an online survey of 284 Austrian hay milk farmers are presented. The statistical analyses included Fisher's exact tests (contingency tables), Kendall's rank correlations and a two-step cluster analysis. The sampled farms show positive attitudes toward the work in agriculture (e.g., contribution to the cultural landscape) and are mainly satisfied regarding several job aspects (e.g., occupational diversity), but to a great extent dissatisfied with others (e.g., social recognition, time resources). The critical stressors are the agricultural policy, the economic situation, too little time for partnership or family life as well as bureaucracy and work overload. Multiple medium associations between aspects of well-being are revealed. Obvious and meaningful relationships between farm characteristics and aspects of well-being are scarce. The cluster analysis does little to help explain the characteristics of well-being within the patterns of farms. It therefore seems that the perception of the investigated aspects of well-being on hay milk farms is mostly formed individually and is only associated with the farms' characteristics to a certain degree.

Keywords: hay milk; dairy farming; social sustainability; well-being; online survey; farm structure

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1. Introduction

Hay milk farming is a particular means of dairy production. As a certified production system, it is widespread in grassland-dominated regions of Austria (about 15% of the milk delivered in Austria [1]) but is also developing in other European countries [2]. The European Union labeled hay milk as a Traditional Specialty Guaranteed (TSG) [2]. In contrast to conventional dairy farming, hay milk dairy cows, sheep or goats get fresh grass, hay and a complementary concentrate feed of up to 25% of the total dietary dry matter—no fermented feedstuffs are allowed and restrictions also apply to a number of other potential feed components [3]. The proponents of hay milk farming claim several benefits on an ecological and economic level (e.g., in terms of biodiversity, resource use, cultural landscapes, higher income), while the social aspects of hay milk farming have hardly been addressed [2,4]. In this paper we aim to explore elements of social sustainability that might be specific to hay milk farmers in Austria.

1.1. The Concept of Social Sustainability—Challenges and Limitations

The discourse on sustainability has long focused on ecological and economic aspects, leaving the social dimension neglected. As a result, the concept of social sustainability still lacks a consistent definition that can be operationalized [5–8]. Notably, various efforts have been made in recent years to conceptualize and develop a theoretical framework on social sustainability. However, the discourse still misses an agreed-upon definition [5–8].

Rogers et al. [9] refer to social sustainability as the fulfillment of needs for human well-being. With reference to a policy brief [10], the authors argue that well-being is a multidimensional concept that includes health, education, work and leisure, agency and political voice, social relationships, stable ecosystems, physical and economic security as well as material living standards. According to them, well-being encompasses both objective components such as material wealth and physical health as well as subjective elements such as social relationships or feelings of happiness [9]. Littig and Griessler [11] also elaborate on the concept of needs. They argue that the general understanding of basic needs such as food, housing, clothing, etc., should be broadened and comprise other needs, such as self-fulfillment, education, recreation and social relations. Furthermore, the authors state that "work" (paid and unpaid labor) plays a crucial role in social sustainability, as the satisfaction of needs usually entails work in one way or another. In this light, they refer to social sustainability as "nature-society relationships, mediated by work, as well as relationships within the society. Social sustainability is given, if work within a society and the related institutional arrangements satisfy an extended set of human needs [. . .]" [11]. The authors further refer to preserving nature and to the normative claims of social justice, human dignity and participation [11].

Despite these efforts, the social dimension of sustainability has fallen short, not only regarding theoretical frameworks and conceptualization but also on the level of operationalization. The FAO has long published guidelines for sustainability assessment for food and agriculture (SAFA) [12] and various tools for assessing sustainability in agriculture [13]. Once again, however, the social dimension seems to be given less attention compared to ecological and economic criteria in the development of those tools [14]. According to a review of 87 farm-related sustainability assessment tools to analyze different definitions and operationalizations of the social dimension, a common understanding of it is still lacking [14]. Nonetheless, certain recurrent topics were identified: human rights, working conditions, life quality, impact on society [14]. These mostly coincide with the above-listed elements of well-being. Moreover, the measurement of social indicators is often difficult due to the high degree of subjectivity [15], the lack of a theoretical framework [11] and the barriers to precise and affordable measurement tools [16].

A commonly analyzed subdomain of social sustainability in agriculture, in general, is the concept of job satisfaction [17–20]. Investigations involving agricultural employees indicate that satisfaction with health and the activity itself can strongly influence overall job satisfaction [21]. A dissertation about Austrian family farms clearly emphasizes the mental stress farmers are nowadays exposed to [22]. A study of 600 Polish farmers revealed positive correlations between living conditions and the economic situation as well as mental comfort. The improvement of the economic conditions, however, might result in lower mental comfort because of a possible work overload [20]. In the Austrian context, a few studies with mixed samples of farmers shed some light on general attitudes and their perception of the future of their farms [23,24].

Several specific assessments of the overall sustainability have been made for the dairy sector, mostly focusing on environmental and economic rather than social indicators [25]. In status-quo analyses of the sustainability of hundreds of dairy farms in two northern German regions, the assessed social aspects have been limited to quantitative estimates for working times, number of days off, salary, further training, work environment [26,27]. However, these results may not be easily applicable to Austrian hay milk farms; the share of non-family employees of around 30% and the bigger size of the farms [26,27] point to some important differences in the farm structure and labor profiles. In a Swiss study

of 12 grassland-based dairy farms, different criteria of quality of life were assessed: the respondents raised concerns about income, insecure political or economic conditions or work overload. Improvements in the mechanization or optimization of the workflow are expected to raise the quality of life [28]. Within a research project that served as a model for the present study in terms of survey questions, the aspects of work satisfaction, physical and mental strains, time resources and work productivity were assessed for 31 organic and conventional Austrian dairy farms [29]. The results showed that the farms which achieved mostly good results regarding aspects of work and life satisfaction could be distinguished by a moderate to a high degree of mechanization [29].

In studies dealing exclusively with aspects of social sustainability in dairy farming, factors determining the level of job satisfaction [30], stressors possibly leading to burnout [31] or their social hotspots, with suggestions for future improvements [32], were examined. A review about health, safety and management practices on international modern dairy farms showed, once again, that hotspots in dairy farms in the Western world mostly differ from Austrian family farms: It is stated that modern dairy farming is "among the most dangerous occupations, with high rates of injury, illness and employee turnover" [33]. Based on a study about the well-being of Finnish dairy farmers, the stressors EU policy, the treatment of farmers in society and the media, work load, unpredictability and animal diseases were prevalent [34]. In a Swiss study about the work load on dairy farms, around two thirds of the surveyed dairy farmers stated that they suffer regularly from pain in the musculoskeletal system [35]. For example, even if modern technology is used, milking is still a heavy to very heavy activity for both males and females [36].

Among the few studies known to us which analyzed influencing factors on satisfaction or well-being, the potential of pasture-based grazing systems was determined to improve the satisfaction of organic dairy farmers [37]. Moreover, according to a study of Norwegian dairy farmers, job satisfaction may be increased by a rise in income, the existence of a modern barn infrastructure and a potential successor with the intention of continuing the farm [30]. Another study by the same authors about dairy farms using automatic milking systems found that the factors gender, education, having a successor and a network of colleagues, herd size, experience and training in the use of automatic milking systems, as well as having access to advisory services, are associated with aspects of farmer well-being, indicated by income, job satisfaction, mental health and family–work balance [38]. Being able to invest in projects on their farms may increase Austrian dairy farmers' satisfaction with their quality of life [39].

1.2. Specific Characteristics of Hay Milk Production

As mentioned above, hay milk production in Austria differs substantially from most international dairy production systems: farms are small and family-based, and the majority of farms is located in mountainous regions of Austria with relatively low productivity, but at the same time with a high physical work load [40]. Only low amounts of concentrates are allowed, and the main feedstuff used is (dried) grass [3]. These characteristics might affect the above-mentioned aspects of well-being and thus social sustainability in a specific matter. The results from studies on the social aspects of intensive milk production thus need to be very carefully examined for their relevance for Austrian hay milk farms.

To the best of our knowledge, no peer-reviewed articles have been published about social sustainability in hay milk farming. Nevertheless, two surveys about Austrian hay milk farmers should not remain unmentioned: one reached 1250 hay milk farmers and provided some insights into the specific motivation for hay milk production [41]; in the other, 1440 hay milk farmers provided information on farm structure, motives for hay milk production and success factors [40].

Considering the sustainable development goals (SDGs) of the United Nations seeking "to achiev[e] sustainable development in its three dimensions—economic, social and environmental—in a balanced and integrated manner" [42], food supply chains are important areas for action for sustainable development. Grass-based milk products like hay milk

seem to present a response to changing consumer demands [43] and a promise to contribute to the sustainable development of dairy production [2]. However, all three dimensions of sustainability need to be sufficiently addressed. In the absence of specific information on the social sustainability of (Austrian) hay milk production, the present study serves as a first exploration in this thematic field and can be seen as a first step in developing a broader set of social indicators for assessing the social sustainability of small-scale dairy production.

Examining data from an online survey of 284 hay milk farms, this study aims to answer the following research questions: How do Austrian hay milk farmers perceive selected issues regarding their living and working conditions and how does this perception contrast with results from other studies in similar fields? What kind of relationships can be determined between (groups of) farm characteristics and aspects of well-being? Which relationships exist between different aspects of well-being? We hypothesize that selected aspects of social sustainability in Austrian hay milk production differ from mainstream dairy production. We also expect to identify certain farm characteristics significantly associated with indicators of well-being.

2. Materials and Methods

The present data originate from an online survey conducted in spring 2019. Its purpose was to obtain a wide range of data concerning hay milk farms in Austria in the context of the SDGs. Social sustainability was one aspect among several others. Therefore, this study does not claim to take into account all aspects of this thematic field. The elements of social sustainability that we focused on were aspects of well-being in the context of the specific life and working conditions of hay milk farmers. We considered a broader understanding of well-being and included objective as well as subjective elements, as suggested by Rogers et al. [9] and Littig and Griessler [11]. The questions about the perceived aspects of well-being were partly adopted from a previous project at the University of Natural Resources and Life Sciences of Vienna, in 2013 [29].

Member companies (dairies) of the syndicate for hay milk in Austria (ARGE Heumilch) were asked to send out calls to delivering hay milk farms to participate in the survey. The online questionnaire took around 20 min to complete. The dairies which confirmed having sent out the announcement are linked to a number of 2231 supplying hay milk farms. With 284 completed questionnaires the response rate would be 12.7%. It should be noted that the data collected on aspects of well-being must be understood as the subjective perception of the person completing the survey.

For questions referring to aspects of well-being, closed questions as well as indications on Likert scales were used. The information on farm characteristics was collected via closed questions or open fields, or represents new variables put together from collected information. Calculations involving data on ordinal scales were made by using the average of a group (e.g., 40 for "working hours/week 35< and $\leq$45"). In some cases, outliers had to be removed, where mistakes in data entries were obvious. The variables on the metric scales were converted into ordinal scales (except for cluster analysis).

The average of the 284 farms for which information was provided is slightly larger than the average Austrian hay milk farm, according to the data from the European Union's Integrated Administration and Control System (IACS), in terms of the number of dairy cows, the total quantity of milk delivered and the area of grassland and arable land [44] (Table 1). Conventional dairy farms, i.e., farms which do not produce in line with the standards of the ARGE Heumilch, are larger in terms of dairy cows and the delivered total amount of milk per year and per cow. On average, they also cultivate substantially more arable land, but not more permanent grassland. Our sample comprises a much higher share of organic farms (Table 1).

Table 1. Comparison of hay milk farms according to the online survey, average Austrian hay milk farms and conventional dairy farms according to IACS data from 2017 [44] (farms with less than 5 cows were removed in our calculations with IACS data).

	Hay Milk Online Survey 2019	Austrian Hay Milk IACS 2017	Austrian Conventional Milk IACS 2017
Number of farms	284	5274	20,332
⌀ Number of dairy cows	20	17	22
⌀ Delivered quantity of milk [kg/farm/year]	117,645	93,976	138,569
⌀ Delivered quantity of milk per dairy cow [kg/cow/year]	5576	5621	6362
⌀ Permanent grassland [ha]	20	16	16
⌀ Arable land [ha]	1.16	0.8	9.6
Share of organic farms [%]	57	40	20

The surveyed farms are well representative of most of the important Austrian districts in which hay milk production is located (Figure 1): the share of hay milk farms covered in a certain district are comparable to the official numbers from IACS [44], with the biggest discrepancies for Schwaz and Murtal, with 5 percentage points each.

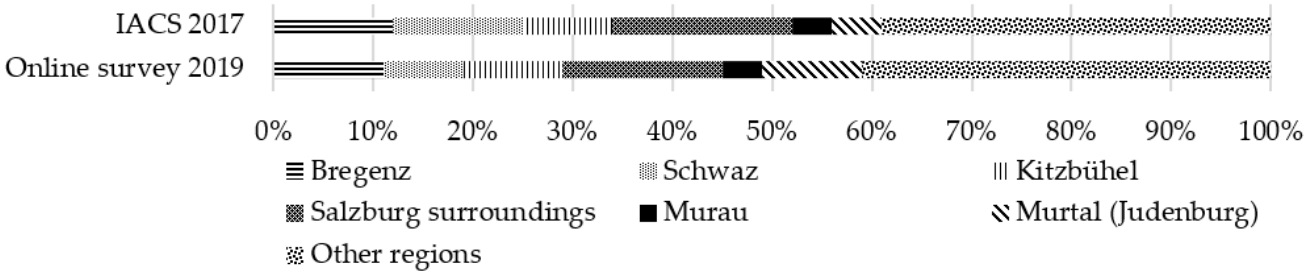

Figure 1. Main production districts for hay milk in Austria: representation among surveyed hay milk farms compared to the overall population of hay milk farms according to IACS data from 2017 [44].

For the statistical analyses, IBM SPSS Statistics 24 [45] was used. For the identification of the relationships between farm characteristics and aspects of the perceived state of well-being and for the relationships between these aspects, the following tools were used: contingency tables for two nominally scaled as well as for nominally and ordinally scaled variables; Kendall's rank correlation for two ordinally scaled variables. As χ^2-tests for contingency tables were not appropriate for cells representing less than five observations [46], Fisher's exact tests were used to test for significance. Phi (two dichotomous variables) and Cramer's V (more values per category) were used as measures for association. The relationships were considered weak for a value between 0.1 and 0.3, from 0.3 to 0.5 as intermediate and above 0.5 as strong [47].

Following the descriptive characterization of the sampled farms and of the relationship between individual farm characteristics and aspects of the well-being of respondents, a cluster analysis was performed. The rationale for choosing a cluster analysis was: (a) to conduct an exploratory data analysis in the absence of previous studies on comparable sets of farms; (b) to assess whether the differences in farmers' perceived state of well-being might become more obvious if farms were grouped according to their similarity in selected farm characteristics. According to IBM [46] a two-step cluster analysis is especially designed for variables with mixed scales; in our case, metric and nominal variables were used. The combination of the farm characteristics in the cluster analysis was explored following certain criteria [48]: special relevance of characteristics, quality of cluster "good", value of predictor importance at least 0.02 (contribution of characteristics to classification in clusters) and significant differences of characteristics between clusters. For most metrically

scaled variables, the standard distribution did not apply, which, according to IBM [46], does not pose a problem. The cluster solutions were then tested against aspects of the state of well-being in contingency tables.

3. Results

3.1. Description of the Farm Characteristics of the 284 Surveyed Austrian Hay Milk Farms

The 284 farmers who completed the online survey can be characterized as follows (Figure 2): they state to have in average around two full-time equivalents (FTEs) labor capacity on the farm (a), of which 0.8 full-time equivalents are female (b). The share of total unpaid working hours out of the total working hours is 0.25 (median) (c). On average, the farms are located 791 m above sea level (d) and keep around 20 dairy cows (e). The majority of the farm managers is between 30 and 60 years old (f), more than half of the farm managers have an apprenticeship as (agriculturally) skilled workers as the highest education level and more than a fourth participated in a master craftsman*woman training (g). The majority uses some kind of technical hay drying system, whereas 13.4% of the farms simply leave the forage on the fields to dry (h).

Around one third of the farms (35.9%) offer additional activities (such as agrotourism, educational activities, offers for disadvantaged or elderly people), and 15.1% process milk on-farm. Nearly all the farms are located in the high alps (40.6%), in the alpine foothills (28.1%) or in the alpine foreland (27.4%), throughout five Austrian provinces (Salzburg 28.1%, Tyrol 27.8%, Vorarlberg 17.1%, Styria 14.2%, Upper Austria 12.1%, Carinthia 0.7%). Two thirds (66.2%) of the farms are managed by men, 22.9% by women, 10.9% by couples. Sixty-three percent of the respondents claimed to be full-time farmers (with more than 50% of the income originating from agriculture), and 35.2% part-time farmers (less than 50% of the income originating from agriculture). Only around 2% of the farmers claimed to have at least one paid workforce that does not belong to the family, and 5% had at least one unpaid person from outside the family.

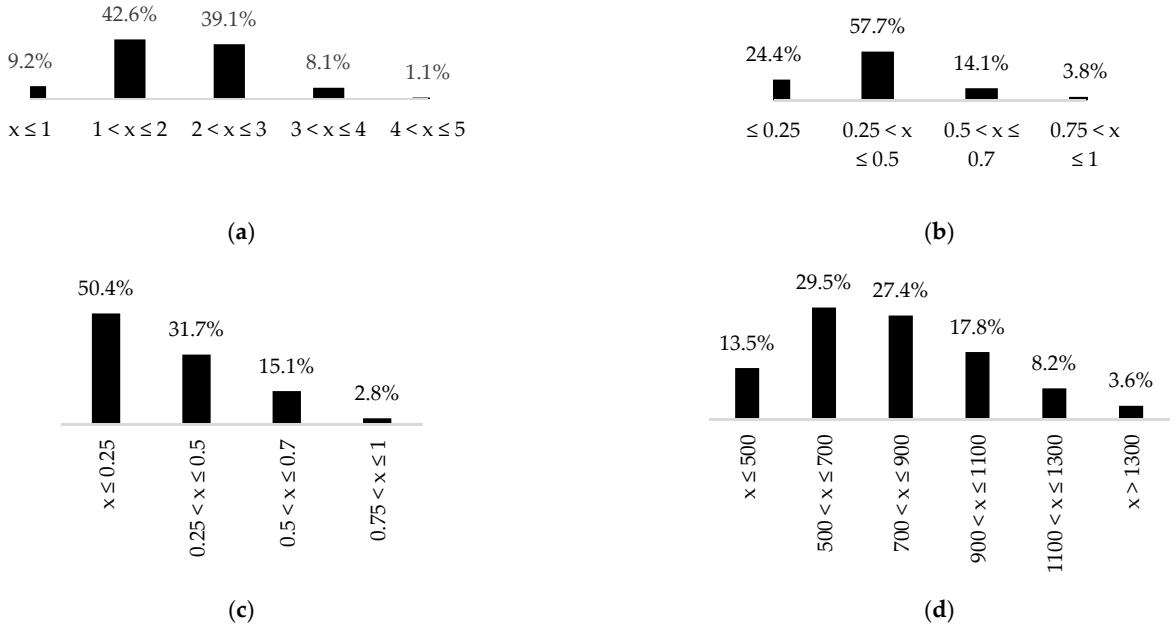

Figure 2. *Cont.*

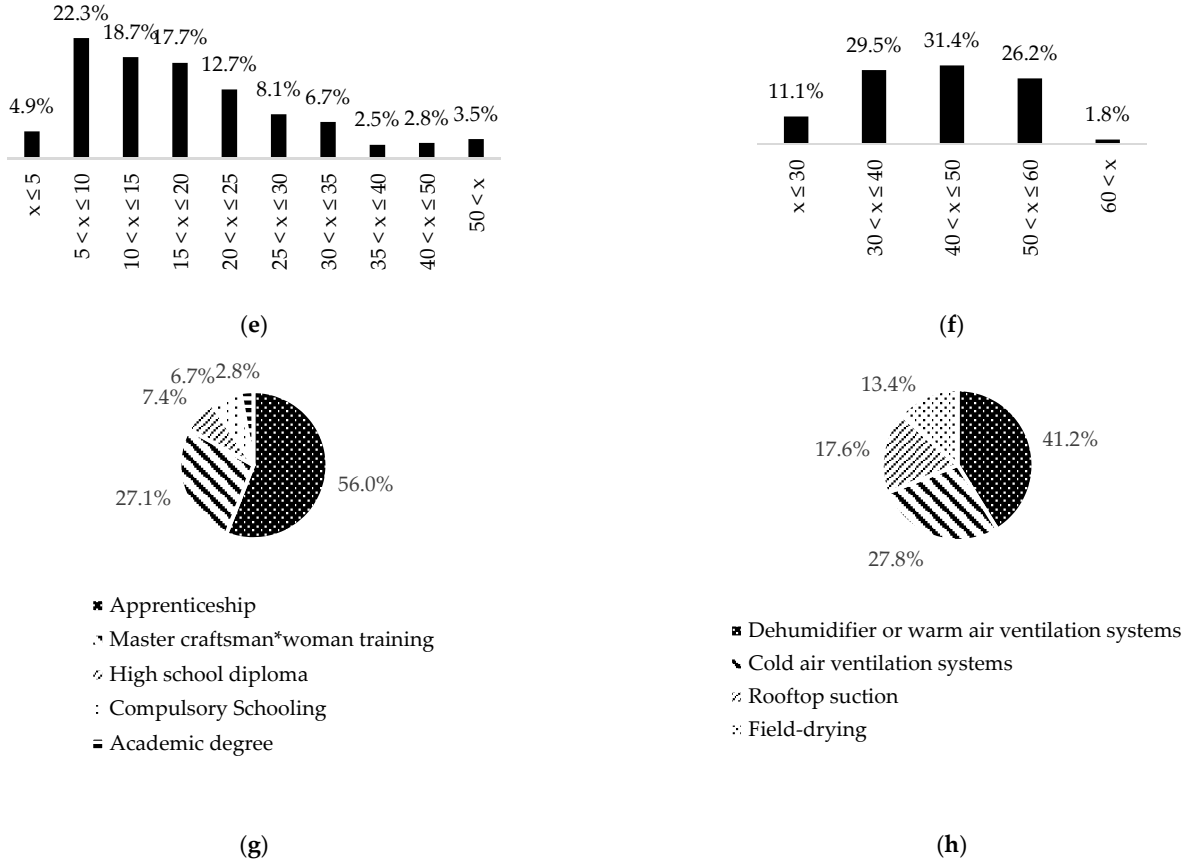

Figure 2. Farm characteristics of the surveyed hay milk farms: (**a**) Number of FTEs in total per farm: Paid and unpaid [1], n = 284; (**b**) Share of female FTEs out of the total FTE [1], n = 234; (**c**) Share of unpaid working hours out of the total working hours, n = 284; (**d**) Sea level [m], n = 281; (**e**) Number of dairy cows, n = 283; (**f**) Age farm manager [years] [2], n = 271; (**g**) Highest education [2], n = 284; (**h**) Most modern technology of hay drying on the farm, n = 284. [1] Full-time equivalent of one person max. 40 h/week; [2] When shared farm management: mean age, highest completed education.

3.2. Aspects of Perceived Work and Life Situation of Austrian Hay Milk Farmers

Looking at the general attitude toward work (Figure 3) of the 284 sampled hay milk farmers, it is striking that the vast majority of the respondents think they make an important contribution to the preservation of the cultural landscape as well as to the regional food production. More than two thirds are proud and happy to be farmers and are committed to hay milk production in contrast to conventional milk. A smaller part (but still the majority) finds work in agriculture generally satisfying and perceives that it contributes to their quality of life. Most farmers do not think their quality of life is negatively affected by the operational circumstances, whereas nearly one fourth explicitly think it is. When it comes to the future viability of the farms, less than half of the surveyed farm managers think their farm can be sustained in the long run. Notably, full-time farmers are more often convinced than part-time farmers that their farm is viable in the long run. The latter, however, feel more often that they benefit from hay milk production (Figure 3).

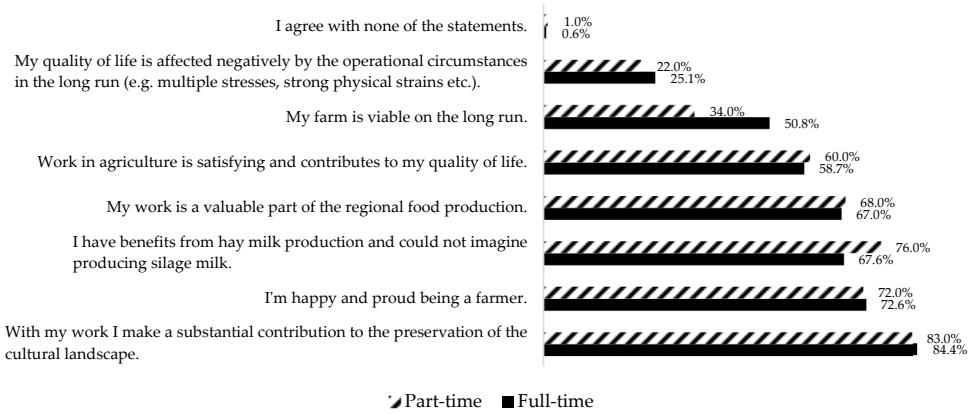

Figure 3. General attitude toward work in agriculture for part-time and full-time farmers: *Which of the following statements meet your personal attitude toward agriculture and work? Multiple choice*, *n* = 284.

Concerning the satisfaction with specific working conditions, the farmers were found to be mostly or very satisfied with the occupational diversity, their choice of profession, the mutual support among family members, the opportunities to extend learning, management responsibilities, safety at work, the relationship with co-workers and the present degree of mechanization (Figure 4). In terms of physical and mental strains, the information policy of the agricultural chambers, the extra payment for hay milk, the volume of work, subsidies, social recognition and income, considerable shares of the respondents are rather unsatisfied or even very unsatisfied (Figure 4).

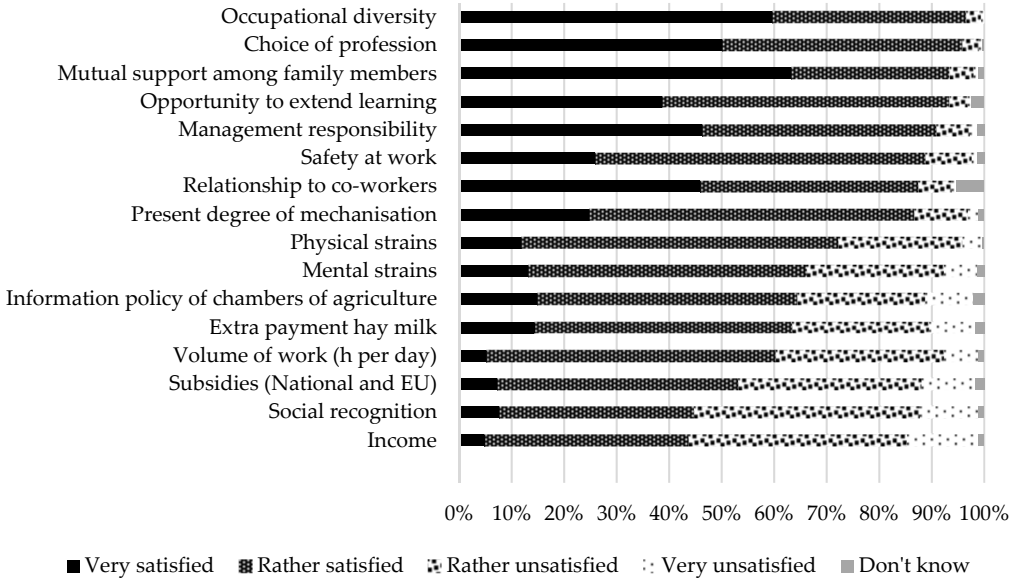

Figure 4. Job satisfaction: *How satisfied are you with . . . ? Single choice*, *n* = 284.

The greatest work-related stressors turn out to be bureaucracy and work overload (i.e., work volume or working hours/day), but working conditions also play a bigger role (Figure 5). Almost 40% state they experience no life situation-related stressors. The second and third most frequently selected options are the lack of time for partnership and conflicts between generations (Figure 6). Within the stressors referring to economy and politics, the agricultural policy (e.g., general legal provisions, subsidies, animal welfare provisions, etc.) is by far the most frequently chosen stressor, followed by the general economic situation and the specific financial situation of the farm (Figure 7).

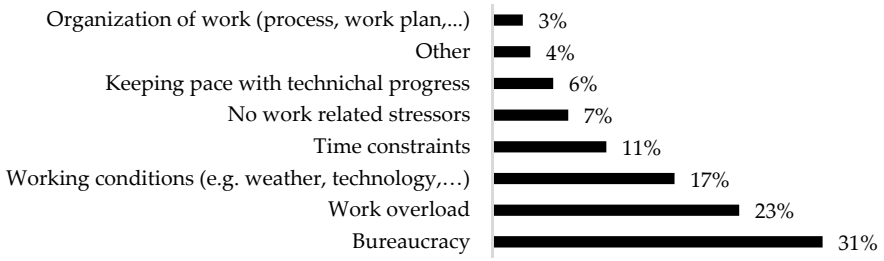

Figure 5. *Work-related stressors: Single choice*, *n* = 284.

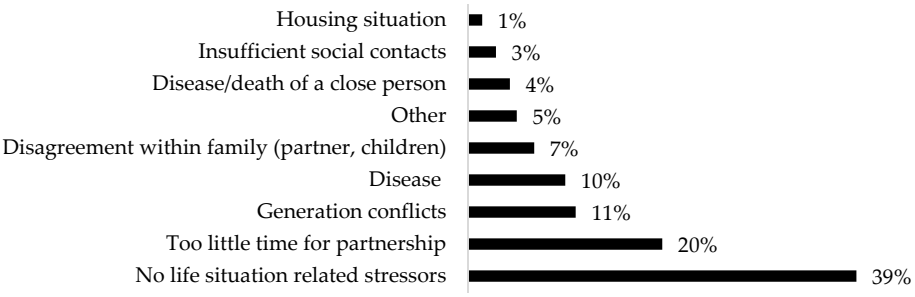

Figure 6. *Life-situation-related stressors: Single choice*, *n* = 284.

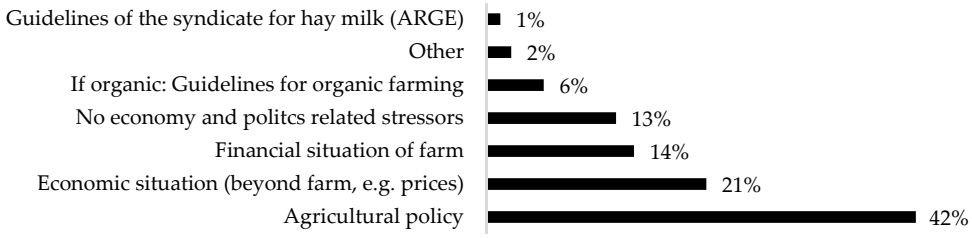

Figure 7. *Economy- and politics-related stressors: Single choice*, *n* = 284.

Fifty-six percent perceive the (negative) effects of agricultural work on mental health as normal, while 25% state that the work has a high or very high effect on their mental health. Almost one fifth, however, finds that the effects are small or very small (Figure 8).

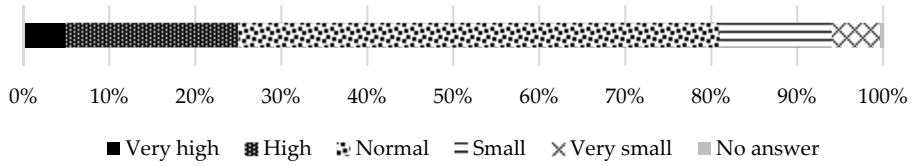

Figure 8. Effects of work on mental health: *How do you judge the current (negative) effects of agricultural work on your mental health? Single choice*, *n* = 284.

About half of the surveyed farmers state that they suffer from occasional physical constraints, slightly less than 20% feel no effects, another 20% feel positive effects on health (i.e., contribution to physical fitness) and a minority mentions frequent physical effects due to work (Figure 9).

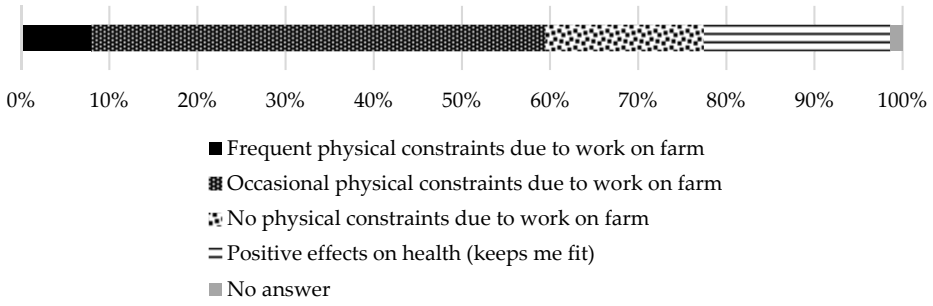

Figure 9. Effects of work on physical health: *How do you judge the effects of agricultural work on your physical health? Single choice*, *n* = 284.

Farmers' perceptions of their time resources show a high variability between agreement and disagreement. On average, they claim to be most satisfied with the time available for partnership/family life and least with the remaining time for their own hobbies (Figure 10).

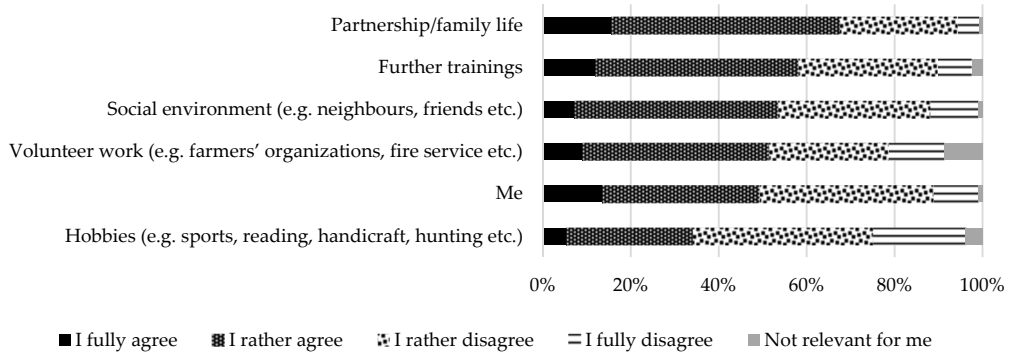

Figure 10. Time resources: *I have enough time for . . . , single choice*, *n* = 284.

The satisfaction with producer milk prices and the conditions of the main customer for hay milk separates the farmers into two similarly large groups, with about half of them being satisfied (51.8%) and the other half not (48.2%).

3.3. Relationships between Aspects of Farmers' Perceived State of Well-Being and Other Traits

3.3.1. Interrelations with Farm Characteristics

The analysis of the connection between farm characteristics and aspects of the farmers' perceived state of well-being revealed some significant, but mostly weak relationships. Table 2 shows all the significant associations. The relations (indicated either by τ for Kendall's rank correlation or Phi or Cramer's V for χ^2 with Fisher's exact tests) above 0.230 are highlighted in grey in Table 2.

Only two statements regarding the general attitude of farmers toward work in agriculture show a noteworthy coherence with the selected farm characteristics. Farmers with less than 1 FTE consider their farm as rather non-viable in the long run. In the group of farms with more than 3 FTEs, more farmers than expected think their farms are viable in the long run. The intermediate groups do not allow, however, for a clear conclusion along the lines of "the more FTEs, the more likely farmers consider their farms as viable". Farm size seems to be another influencing factor: with an increasing number of cows, the farmers are more likely to perceive their farms as viable in the long term.

Table 2. Interrelationships between farm characteristics and aspects of the state of well-being indicated by τ for Kendall's rank correlation, Phi or Cramer's V for χ^2 with Fisher's exact tests; the cells highlighted in grey contain interrelationships above 0.230, which are illustrated in the text.

Farm Characteristics \ Aspects of the State of Well-Being	General Attitude toward Work in Agriculture	Job Satisfaction	Stressors	Effects of Work on Health	Time Resources	Attitude toward Milk Pricing
FTEs in total: Paid and unpaid (ordinal) [1]	Farm is viable in the long run ** V = 0.242			Effects on mental health * τ = −0.124	Myself * τ = −0.127 Hobbies * τ = −0.127	
Share of female FTEs out of the total FTEs (ordinal) [1]			Work-related * V = 0.224 Life-situation-related * V = 0.238			
Share of unpaid working hours out of the total working hours (ordinal)		Mutual support among family members * τ = 0.128				
Sea level (ordinal)	Happy and proud being a farmer * V = 0.205		Life-situation-related * V = 0.214	Effects on mental health * τ = 0.118	Hobbies ** τ = 0.142	
Number of dairy cows (ordinal)	Farm is viable in the long run ** V = 0.351	Income * τ = 0.104 Degree of mechanization * τ = 0.099 Relationship to co-workers * τ = −0.116 Mutual support among family members ** τ = −0.205 Extra payment hay milk ** τ = −0.143	Work-related * V = 0.206			
Age farm management (ordinal) [2]		Management responsibility * τ = −0.111		Effects on physical health τ = −0.125 *		
Offer of additional "activities" (yes/no; nominal)		Information policy of chambers of agriculture ** V = 0.246				
Processing and/or bottling of milk on-farm (yes/no; nominal)	No significant relationships					
Area of production (Austrian classification) (nominal)		Safety at work * V = 0.149 Social recognition ** V = 0.217 Extra payment hay milk * V = 0.174 Subsidies (National and EU) * V = 0.163	Work-related * V = 0.208			

Table 2. *Cont.*

Aspects of the State of Well-Being / Farm Characteristics	General Attitude toward Work in Agriculture	Job Satisfaction	Stressors	Effects of Work on Health	Time Resources	Attitude toward Milk Pricing
Federal state (nominal)	Work is a valuable part of the regional food production * V = 0.202 I have benefits from hay milk production and could not imagine producing silage milk * V = 0.205	Safety at work * V = 0.169 Physical strains ** V = 0.195 Social recognition ** V = 0.208				
Gender farm management (m/f/shared; nominal)			Life-situation-related ** V = 0.238			
Highest education (nominal) [2]	Farm is viable in the long run ** V = 0.218 Work in agriculture is satisfying and contributes to my quality of life * V = 0.188	Income * V = 0.175	Life-situation-related ** V = 0.230			
Full- or part-time farming (nominal)	Farm is viable in the long run ** phi = −0.162				Volunteer work ** V = 0.221	
Technology of hay drying (nominal)	Work is a valuable part of the regional food production ** V = 0.258	Choice of profession ** V = 0.178				
Organic/conventional (nominal)	Farm is viable in the long run * phi = 0.143 Work is a valuable part of the regional food production * phi = 0.154	Income ** V = 0.242 Physical strains * V = 0.182 Mental strains * V = 0.171 Social recognition * V = 0.181	Economy- and politics-related * V = 0.219			Satisfaction with producer milk prices and conditions (of main customer) for hay milk ** Phi = 0.237

[1] Full-time equivalent of one person max. 40 h/week; [2] When shared farm management: mean age, highest completed education; * $p \leq 0.05$; ** $p \leq 0.01$ (Fisher's exact test; where the volume of data was too big, the test was simulated with Monte-Carlo, 200,000 iterations).

Hay drying technology is also associated with the farmers' perception of their relevance in food supply chains: farmers relying on simpler technology (i.e., hay is dried on the field and with a rooftop air suction) see their production of milk and beef less often as a valuable contribution to food supply. Contrarily, farmers using cold and warm air ventilation systems as well as dehumidifiers perceive their production more often as an important part of the regional food supply.

Concerning the aspects of work satisfaction, two relevant connections can be seen: Farmers offering extra activities on their farms claim more often than predicted that they are very satisfied with the information policy of the agricultural chambers. They are also less often rather unsatisfied and very unsatisfied than those with no additional activities. The latter are in turn more often rather satisfied. Moreover, organic farmers are mostly very satisfied or rather satisfied with their income as compared to conventional farms.

Regarding the stress factors, life-related stressors revealed the strongest interrelations with farm characteristics. Farmers with a low proportion of female working time on their farms (less or equal 25%) claim more often than expected to have no life-related stressors. At farms with 25% to 50% of working time carried out by women, disease or too little time for partnership is selected more often, whereas the statement "no stressors" is chosen less often. Farmers of farms managed by men claim more often than expected that they do not have any life-related stressors as well as too little time for partnership as their biggest stressor. Survey participants of farms managed by women choose those two stressor choices less often and the accident/death of a closely related person more often than predicted. If farms are managed by women or with a shared management, generation conflicts are chosen more often than expected. Farmers with the highest formal education of skilled (agricultural) worker choose less often than expected the two options of no stressors and too little time for partnership, and farmers with a master craftsman*woman training choose these options more often, but less often generation conflicts. Moreover, farmers with the highest formal education of skilled (agricultural) worker report disease, generation conflicts or others more often than assumed. Farmers who attended a high school and obtained a diploma claim to have too little time for partnership more often than the overall sample. Farmers with an academic degree decide for no stressors less often than predicted.

One significant relationship regarding the satisfaction with producer milk prices and the conditions of the main customer for hay milk can be pointed out: organic farmers are significantly more often satisfied than conventional farmers.

Although no other interrelationships above 0.230 were found, lower values of coherence (Table 2) do not necessarily mean they ought to be neglected. Rather, they should be kept in mind as slight tendencies.

3.3.2. Cluster Analysis: Explorative Grouping of Farms along Selected Farm Characteristics and Potential Differences between Them in Aspects of Well-Being

As shown in the previous chapter, farm characteristics can only sparsely explain aspects of well-being. It was thus assessed whether those aspects can be better explained if compared between similar groups of farms. Therefore, different cluster solutions were explored. These solutions were then tested against aspects of the state of well-being, using contingency tables. The results show only a few weak, though significant, differences between the single clusters within one solution and do not contribute much to finding specific patterns.

As an example, one cluster solution shall be illustrated here. For this solution, the following farm characteristics were used: number of cows, age of farm manager (when farm management was shared: mean age) and whether milk is processed on-farm. By means of these characteristics, the farms could be divided into four clusters by a two-step cluster analysis (14 farms were excluded due to missing data). The clusters can be characterized as follows:

- Cluster 1 (40 farms): ⌀ 15 cows & ⌀ 45 years & milk processing/bottling

- Cluster 2 (40 farms): ⌀ 41 cows & ⌀ 38 years & without processing/bottling (except for one farm)
- Cluster 3 (92 farms): ⌀ 19 cows & ⌀ 53 years & without processing/bottling
- Cluster 4 (98 farms): ⌀ 14 cows & ⌀ 37 years & without processing/bottling

The strongest significant connection—though still weak, with Cramer's V = 0.29, according to [47]—with aspects of well-being was found for the statement "farm is viable in the long run": the farmers of cluster 1 and 2 tend to think their farm is rather viable, whereas the farmers in cluster 3 perceive that the opposite is the case more often than expected. Cluster 4 does not differ from the total sample.

As the comparison of other cluster solutions with aspects of well-being does not deliver a conclusive picture, we refrain from presenting more results of the cluster analysis and the χ^2 and Fisher's exact tests.

3.3.3. Interrelations among Aspects of the Perceived State of Well-Being

Regarding the interrelationships within aspects of the perceived state of well-being, many significant connections were found. Most of them, however, are weak or moderate. Herein, only those with τ- or V-Values higher than 0.450 (TOP 15) are illustrated (Table 3). As the relationship to co-workers and the mutual support among family members cover very similar issues on family farms, the resulting correlation is particularly high (τ = 0.583). The time-related aspects show a strong positive correlation with each other (e.g., time for social environment with time for partnership/family life and time for myself, τ = 0.539 and 0.523, respectively). Aspects of physical and mental strains correlate moderately to strongly with each other and with the work volume (e.g., volume of work with physical strains, τ = 0.503). Management responsibilities strongly correlate with the opportunity for extend learning (τ = 0.516) as well as occupational diversity (τ = 0.504). Farmers who are satisfied with the extra payment for hay milk are more often satisfied with the producer milk prices and conditions for hay milk (V = 0.516) and also with the subsidies paid (τ = 0.488). Being proud and happy to be a farmer strongly correlates with the satisfaction with the choice of profession (V = 0.513). The more they are satisfied with the latter, the more farmers think their farms are viable in the long run (V = 0.454) (Table 3).

Table 3. Top 15 (effect size from 0.450 upward) interrelationships between aspects of the state of well-being; type of effect size: τ for Kendall's rank correlation, Cramer's V for χ^2 with Fisher's exact tests.

Interrelationships between Aspects of the State of Well-Being	Type of Effect Size	Effect Size
Relationship to co-workers—Mutual support among family members **	τ	0.583
Time partnership/family life—Time social environment **	τ	0.539
Time myself—Time social environment **	τ	0.523
Management responsibility—Opportunity to extend learning **	τ	0.516
Extra payment hay milk—Satisfaction with producer milk prices and conditions (of main customer) for hay milk **	V	0.516
Happy and proud being a farmer—Choice of profession **	V	0.513
Time myself—Time partnership/family life **	τ	0.512
Time hobbies—Time myself **	τ	0.507
Management responsibility—Occupational diversity **	τ	0.504
Volume of work—Physical strains **	τ	0.503
Time social environment—Time hobbies**	τ	0.502
Extra payment hay milk—Subsidies **	τ	0.488
Physical strains—Mental strains **	τ	0.467
Farm is viable in the long run—Choice of profession **	V	0.454
Physical strains—Effects of work on physical health **	τ	0.452

** $p \leq 0.01$.

4. Discussion

Grass-based dairying is seen as potentially meeting the needs for more sustainable production [2,43]. Studies about sustainability in the dairy sector should thus consider and include this specific production system. To our knowledge, there are very few studies determining the associations between aspects of well-being and farm characteristics on farms applying this type of production systems. Hence, this study can be considered a first approach to exploring components of social sustainability, such as farmers' well-being, in hay milk production.

4.1. Context of the Sample

The number of FTEs of the 284 surveyed hay milk farms (Figure 2) is similar to that of a previous study of 31 Austrian dairy farms [29]. The average share of worktime for agricultural activities attributed to women was found to be lower than 50% in both cases (Figure 2) [29]. It is important to notice that a considerable amount of work is done on an unpaid basis by (family) labor (Figure 2), which is not directly dependent on the farm's agricultural income. The prevalence of an apprenticeship as (agriculturally) skilled workers as the highest formal degree of education and a master craftsman*woman training as the second most frequent level of formal education (Figure 2) also appear in a survey among 1475 hay milk farmers in Austria from 2016 [40]. The age structure of the two samples is also similar (Figure 2) [40]. The Austrian average of female-managed farms is 25%, and the share of farms with a shared farm management is 13% [1]. Those numbers come close to the respective situation in this study. It should be underlined that around a third of the farms in the sample produce a specific societal impact by offering activities such as agrotourism, educational activities or offers for disadvantaged or elderly people. In 2016, 36% of all agricultural operators in Austria were full-time farmers, and 55% managed their farms part-time [1]. Conversely, the present sample is mainly characterized by full-time farmers. Furthermore, the above-average share of organic farms in the sample compared to the Austrian average of hay milk or conventional dairy farms must be noted (Table 1). Compared to the mentioned hay milk survey of 2016 [40], the share of farms relying on field-drying only for forage conservation is substantially lower in the present study (Figure 2). An explanation could be that modern farms were more easily reached by the online survey. Experts mention the potential of hay drying facilities to increase not only hay quality, but also the farmers' quality of life, which could be a positive signal for potential farm successors [40]. Herein, farmers who used the most modern hay drying technologies see themselves as adding value to the regional food production; thereby, they might also contribute to such a positive sign.

4.2. Aspects of Well-Being among Hay Milk Farmers

4.2.1. General Attitudes about Work in Agriculture and the Strategy of Growth

The work on the farm is often described as fulfilling (Figure 3), as was reported for a similar sample [28]. The general attitudes to the work in agriculture in our sample (Figure 3) do not differ much from those in other dairy farms in Austria [29]. The findings of a study about work satisfaction in viticulture, according to which a passion for the product can influence job satisfaction [19], cannot be confirmed by the present data, as the questions were not specific enough. Pointing in this direction, however, is the affirmation of more than three quarters of the respondents, who are content with hay milk production and who do not want to switch to a different production system (Figure 3). It seems plausible, when it comes to hay milk farmers, that their identification with the product might be a key factor for the successful continuation of farming by the next generation. However, this is not well understood yet, and further research is suggested in this thematic field. It should be noted that hay milk farmers seem to perceive an insufficient societal support, as their satisfaction with social recognition is rather low (Figure 4).

The majority of the farmers are in doubt about the long-term economic viability (Figure 3), which supports the findings of [23]. In order to ensure the economic viability of

their farms, farmers frequently adopt a strategy of growth. This may also be reflected in our sample, in which the farmers with more dairy cows, a higher number of FTEs or in full-time farming more often perceive their farms as being viable (Table 2, Figure 3). This also applies to the resulting cluster 2, with the highest number of dairy cows. However, a review of 53 papers dealing with the future of family farms concludes that future viability certainly depends on the adaptability to changing environments and the adjustments in business strategies. The next generation's "sense of attachment" is seen as another important factor in this context [49]. The trend toward growth should also be questioned in the light of the findings from an analysis of 600 Polish farms, which show that economic improvements may lead to a lower mental comfort [20]. Considering the potential pathways of hay milk farming, this trap should be avoided by trying to achieve a revenue for quality, rather than increasing the quantity. The significantly greater satisfaction of organic hay milk farms with their income, with the producer milk prices and the conditions of the main customer (Table 2), as compared to the conventional hay milk farms, suggests that this might be a promising option for future development. The strong correlation between the satisfaction with the extra payments for hay milk and the overall milk price (Table 2) seems to indicate the effect of a premium for hay milk on the perception of the overall milk price.

4.2.2. Stressors and Physical and Mental Strains

The findings that the agricultural policy and the economic and financial situation are among the biggest stressors related to politics and economics (Figure 7), and that the bureaucracy is among the biggest work-related stressors (Figure 5), are confirmed by a Swiss study of grassland-based dairy farms [28]. In contrast to a sample of Austrian dairy farmers [29], the hay milk farmers included in this study considered a stressing financial situation to be less important than the stress due to the agricultural policy (Figure 7). This might indicate a slightly better economic situation in hay milk farms compared to conventional dairy farms.

The generally high workload found here (Figure 5) is confirmed by surveys among Austrian farms [24]. Finnish researchers also identified those critical stressors and added social recognition, future uncertainties in agriculture and the unpredictability of work [34]. All these stress factors were also found in our results (Figures 3–5). The same study revealed associations of workload and health stressors with burnout symptoms in dairy farmers, whereas positive judgements on the work and living environment diminished the probability of burnout [34]. This issues should be kept in mind as possible follow-up effects of the perceived well-being of dairy farmers. This is particularly important, as around 25% of the sampled farmers explicitly claim to experience a high or very high mental exposedness (Figure 8). The correlations found between the volume of work and physical strains as well as physical and mental strains (Table 3) point in the same direction. In contrast to an examination of the strains among farmers in the Austrian province of Styria, which indicates that mental strains became even more important than physical strains in modern agriculture over time [22], a ranking cannot be made here. Nevertheless, physical strains should not be underestimated, as both the hay milk sample and another Austrian sample show considerable shares of farmers who suffer at least somewhat from effects on physical health (Figure 9) [29]. There is a great willingness to invest in work comfort in order to maintain their health status [50].

The fact that the absence of life-related stressors is the most frequently chosen answer in this category (Figure 6) indicates that work, economics and policy carry more weight in terms of what farmers are mostly bothered by. However, the respondents from women-managed farms claim more often to have a life-related stressor (Table 2), which possibly points out that women's concerns are more related to (family) life, where men might have a slightly weaker focus on this factor. The higher perception of a lack of time for partnership among farms managed by men compared to farms managed by women (Table 2) coincides with the findings among other dairy farms in Austria, where men and women also have different opinions about those stressors [29]. The results also point to different formal

education levels being able to influence the perception of life-related stressors (Table 2). In general, the main stressors found in the present study are supported by findings from the national and international literature [29,31].

4.2.3. Job Satisfaction and Time Resources

The high value of satisfaction with the choice of profession (Figure 3) coincides with statements of Austrian farm managers from all kinds of agricultural businesses: nearly three quarters of the respondents claim to be satisfied with the choice of profession [23]. The strong correlations between the satisfaction with the choice of profession and other aspects (happy and proud being a farmer, farm is viable in the long run) (Table 3) are indicative of the importance of the motivation and identification with being a farmer in order to feel "happy and proud" and the perception of successfully running a business.

It seems that being a hay milk farmer does not prevent farmers from perceiving job satisfaction aspects like income, strains, volume of work, agricultural policy (Figure 4) as challenging, as other dairy farmers in Austria [29]. The great importance of—and great satisfaction with—the support by the family (Figure 4) is confirmed by [40] and points at the specificity of family farms. Whenever farmers are satisfied with the responsibility they have, they also see their farm as a place of learning and perceive diversity in their job (Table 3).

Although farmers perceive, on average, a limitation in time resources for aspects beyond daily work, the results allow for insights into their ranking of priorities: Apart from farm work, most time resources seem to be dedicated to the family or the development of personal skills (further trainings) (Figure 10). There does not seem to be enough time for their own hobbies (Figure 10). This pattern can also be seen in [29]. Furthermore, the satisfaction with different domains of time resources positively correlating with each other (e.g., time partnership/family life with time for the social environment) suggests that time is not exclusively spent for a specific purpose (Table 3).

4.3. Limitations of the Study and General Considerations

A potential weakness of this study might be that it is based on data representing the subjective perception of farmers. It is possible that certain informations (e.g., on the workforce) are inaccurate, as questions can leave much room for subjective interpretations and are prone to estimation errors. Specific demographic data of the person actually completing the survey are not available. Therefore, gender- or age-specific statements on well-being can only be made on the basis of structural farm data. As the online survey was not meant to map an entire analysis of well-being on hay milk farms, the results presented herein are partially fragmented.

Besides the importance for human well-being, the aspects examined in this study may also have impacts on other fields of sustainability. A project about dairy farms in Norway, for example, found direct positive associations between occupational well-being and low levels of stress with an animal welfare indicator [51].

The aspects of social sustainability of Austrian hay milk farmers did not clearly contrast with other (international) dairy farm samples. One interpretation of this might be that dairy farmers—no matter how their farms are structured—all feel similar problems in their daily working life. Different degrees of perception are conceivable, however. To measure this and to find out whether certain aspects of well-being stand out among hay milk farmers, further research is needed, ideally in the context of an international comparative study. For that purpose, a starting point could be to analyze the "benefits from hay milk production" (Figure 3) perceived herein in a more detailed manner.

Compared to the few studies which we know of that found associations between potentially influencing factors on satisfaction or well-being, our study revealed only a few meaningful relations between farm characteristics and aspects of well-being (Table 2). Moreover, a cluster analysis hardly helps to explain patterns in the characteristics of well-being. Conceivable reasons could be different factors used (e.g., kind of grazing

system [37], having a farm successor, access to counseling [38]), different (condensed) well-being aspects [38], weaknesses in our demographic data (see limitations) or our own conservative threshold for the interpretation of an effect size.

5. Conclusions

The present study provides insights into the perception of selected issues related to the living and working conditions of hay milk farmers. They show largely positive attitudes toward the work in agriculture (e.g., contribution to the cultural landscape, proud of being a farmer), they are satisfied regarding many job aspects (e.g., occupational diversity, choice of profession) and mainly dissatisfied with others (e.g., income, social recognition). The critical stressors are agricultural policy, the general economic situation and the specific financial situation of the farms, as well as the bureaucracy and work overload. Negative effects on mental and physical health are also revealed. The majority of the farmers claim to have no life-related stressors. The limited time for partnership and family life is the second most frequent answer. The importance of family life is also reflected in the allocation of time resources. The great overall satisfaction with the support by the family emphasizes a particularity of family farms. Selected aspects of social sustainability in Austrian hay milk production were not found to differ considerably from other conventional dairy farm samples. Future research focusing on specific comparisons between different systems is needed.

Some relationships exist between certain farm characteristics and aspects of well-being as well as within aspects of well-being. The surveyed farmers with the most modern hay drying technologies claim more often that they are adding value to the regional food production. Although hay milk seems to present an alternative to the paradigm of growth in order to secure economic survival, the respondents from farms with more dairy cows see a higher chance for future viability. However, the finding that farmers who are satisfied with their choice of becoming a farmer consider their farm as viable in the long run emphasizes that the pleasure of being a hay milk farmer may also be linked to a perceived stable financial situation. The finding that organic hay milk farmers are more satisfied with their income than conventional hay milk farmers hints at the possibility of achieving a revenue for a specific quality, and not for quantity. The detected relationships within health issues or between health issues and stressors (e.g., volume of work) support the findings of other studies covering dairy farming.

Obvious and meaningful relationships between farm characteristics and aspects of well-being are scarce. The cluster analysis is not very helpful to explain the characteristics of well-being within groups of farms. It therefore seems that the perception of the investigated aspects of well-being on hay milk farms is mostly formed individually and is only associated with the farms' characteristics to a certain degree.

A next step toward understanding social sustainability on hay milk farms and possibly influencing the farms' characteristics would be the adoption of a broader set of indicators, including more detailed aspects about work and life quality (e.g., modernity of the farm, satisfaction with specific activities, future stability, resilience) and issues on human rights and the impact on society (e.g., considering the whole value chain). Overall, future studies in the field of sustainability in agriculture should pay attention to the balance between ecological, economic and social aspects.

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